REMARKS

Reexamination of the above-identified application is respectfully requested.

Status of the Claims

Claims 1, and 3-20 are pending in the application.

Claims 1, 4, 11, 12, 14, 15, and 17 have been amended.

Claim 2 was canceled by a prior amendment.

Claim 20 is added.

The Office Action

The drawings were objected to under 37 CFR 1.83(a) for failing to show agraphical representation of a white emitting halophosphate which is at least approximately the same as the lamp.

Claims 4, 11, 14, and 15 were objected to for informalities. These claims have been amended to depend from claim 1, as suggested by the Examiner. Accordingly, it is requested that the objection be withdrawn.

Claims 1, 5, and 14-16 stand rejected under 35 U.S.C. §102 (b), as being anticipated by de Hair, et al. (US 4,602,188).

Claims 3, 11-13, 17, and 18 stand rejected under 35 U.S.C. §103 (a), as being unpatentable over de Hair, et al. (US 4,602,188).

Claim 4 stands rejected as being unpatentable over de Hair, et al. (US 4,602,188) in view of McSweeney (US 5,232,626).

Claims 6-10 stand rejected as being unpatentable over de Hair, et al. (US 4,602,188) in view of Shimizu, et al. (US 6,224,240).

The Drawings

Applicant submits that it is not necessary to illustrate graphically a white halo having a correlated color temperature which is approximately the same as the lamp. The specification indicates that "cool white" halo has a temperature of about 4100K (page 6, lines 11-18). Figure 2 shows a spectrum of a triphosphor blend having a color temperature of 4000K which may be combined with the cool while halo, the spectrum of which is illustrated in Figure 3. It will be readily appreciated to

one skilled in the art that the final color temperature of the combination of the triphosphor blend of Figure 2 and the cool white halo of Figure 3 will be close to 4100K, the exact temperature depending on the proportions in the blend. Note in Example 3, the nominal color temperature of the lamp is 4100K, i.e., the object was to achieve a color temperature which is the same as the color temperature of the cool white phosphor used in the blend (although slight variations may occur in practice).

It is therefore submitted that no drawing changes are necessary.

In the event that the Examiner deems that further drawing changes are necessary, the Examiner is asked to identify what further information should be presented in the drawings.

The Claims Distinguish over the References of Record

Claim 1 has been amended and now recites a mercury vapor discharge lamp comprising a phosphor-containing layer coated inside an envelope which includes a blend of a blue-green emitting halophosphate, a red-emitting phosphor, a green-emitting phosphor, and a white-emitting halophosphate. The white emitting halophosphate has a correlated color temperature which is at least approximately the same as that of the lamp. The blue-green emitting halophosphate has a peak at about 470-490 nm, the red-emitting phosphor has a peak at 600-620 nm, the green-emitting phosphor has a peak at 535-555 nm, and the white-emitting halophosphate has a first peak at about 570-590 nm and a second peak at about 470-490 nm. The blend optionally includes a blue-emitting phosphor having a peak at 470-510 nm.

Support for the amendments to claim 1 are to be found in the specification at page 9, para 29.

The references of record do not suggest such a lamp. Applicants have found that be careful selection of rare earth phosphors, and incorporation of a blue-green halophosphor, a triphosphor blend can be created which has a correlated color temperature which is the same or approximately the same as that of the lamp. This allows the triphosphor blend to be mixed with a significant amount of a white halophosphor to form a blend without affecting the final color temperature of the lamp. As a result, the blend can be applied as a single layer, rather than a conventional two layer structure.

de Hair, et al. does not disclose such a phosphor blend. de Hair is concerned with achieving a deep red rendition of the lamp (Abstract). deHair broadly discloses calcium halophosphates but does not disclose the halophosphate as having a first peak at about 570-590 nm and a second peak at about 470-490

nm. Th Examiner argues that de Hair discloses a halophosphate with a color temperature approximately the same as that of the lamp. However, de Hair discloses a wide range of color temperatures and makes no mention that a particular color temperature should be selected.

The references cited against the dependent claims do not supply the deficiencies of the primary references. McSweeney and Shimizu do not suggest providing a phosphor blend in which a white emitting halophosphate has a correlated color temperature which is at least approximately the same as that of the lamp.

Accordingly, it is submitted that claim 1, and claims 3-11 and 14-16 dependent therefrom, distinguish patentably and unobviously over the references of record.

Claim 12 has been amended to recite a mercury vapor discharge lamp including a blend of phosphors including a blue-green emitting halophosphate, a red-emitting phosphor, a green-emitting phosphor, and a white-emitting halophosphate. The white-emitting halophosphate comprises 60-80% by weight of the blend of phosphors. The blue-green emitting halophosphate has a peak at about 470-490 nm, the red-emitting phosphor has a peak at 600-620 nm, the green-emitting phosphor has a peak at 535-555 nm, and the white-emitting halophosphate has a first peak at about 570-590 nm and a second peak at about 470-490 nm.

The Examiner argues that it would be obvious to include about 70% white emitting halophosphate in the phosphor of de Hair because it is known to change the color temperature of the emitted radiation. However, use of such a large amount in de Hair's phosphor would significantly affect the color temperature and CRI of de Hair's lamp. de Hair's red and green phosphors have, in combination, a color temperature of 2850K. Using large amounts of halo with a color temperature in excess of 2900K would affect the color temperature of the lamp.

Typically, large amounts of white halo are undesirable because they reduce the CRI, affect the color temperature, and thus increase the amount of the expensive, rare phosphors used overall. Conventionally, where a white halo is to be employed, it is formed as a separate layer. Applicants have formed a triphosphor blend which uses a blue-green halo and which allows large amounts of a white halo to be employed without adversely affecting the properties of the lamp. There is no need for a separate white halo layer. This is not shown or suggested in de Hair.

Accordingly, it is submitted that claim 12, and claim 13 dependent therefrom, distinguish patentably and unobviously over the references of record.

Claim 17 has been amended similarly to claim 1 and recites a method of forming a lamp which includes forming a blend of phosphors. The blend of

phosphors includes a blue-green emitting halophosphate, a red-emitting phosphor, a green-emitting phosphor and a white-emitting halophosphate. The white emitting halophosphate has a correlated color temperature which is at least approximately the same as that of the lamp. The blue-green emitting halophosphate has a peak at about 470-490 nm, the red-emitting phosphor has a peak at 600-620 nm, the green-emitting phosphor has a peak at 535-555 nm, and the white-emitting halophosphate has a first peak at about 570-590 nm and a second peak at about 470-490 nm.

de Hair makes no suggestion of such a method. de Hair broadly discloses calcium halophosphates but does not disclose the halophosphate as having a first peak at about 570-590 nm and a second peak at about 470-490 nm.

Accordingly, it is submitted that claim 17, and claim 18 dependent therefrom, distinguish patentably and unobviously over the references of record.

There being no references cited against **Claim 19** it is presumed that claim 19, and claim 20 dependent therefrom, are in condition for allowance.

CONCLUSION

For the reasons set forth above, it is submitted that claims 1 and 3-20 distinguish patentably over the reference of record. An early allowance of these claims is earnestly solicited.

Respectfully submitted,

FAY, SHARPE, FAGAN,
MINNICH & McKEE, LLP

May 24, 2004
Date

Timothy E. Nauman, Reg. No. 32,283
Ann M. Skerry, Reg. No.45,655
1100 Superior Avenue, 7th Floor
Cleveland, Ohio 44114-2518
216/861-5582

N:\GECZ\200609\cmk0002964V001.doc